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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,645	04/15/2005	Masashi Kumagai	4700.P0312US	1483
23474 7590 07/23/2009 FLYNN THIEL BOUTELL & TANIS, P.C. 2026 RAMBLING ROAD KALAMAZOO, MI 49008-1631				
EXAMINER MENDEZ, ZULMARIAM				
ART UNIT		PAPER NUMBER		
1795				
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07/23/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,645

Applicant(s)

KUMAGAI ET AL.

Examiner

ZULMARIAM MENDEZ

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

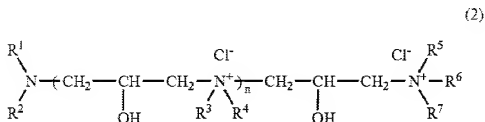
2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 5-8 rejected under 35 U.S.C. 103(a) as being unpatentable over Strauss et al. (US Patent no. 2,842,488) in view of Greaves et al. (US Patent no. 4,692,316).

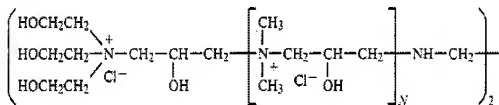
With regard to claims 5-8, Strauss discloses a process for producing bright metal electrodeposits and more particularly to electroplating solutions containing additives which eliminate the adverse effects of impurities in such solutions (col. 1, lines 17-21) by adding tertiary and secondary amino groups to the bath (col. 1, lines 63-70 and structures of col. 2) and wherein the quaternary compound is produced by the mixture of such additives and epichlorohydrin (col. 4, lines 53-60) and an organic sulfur compound, such as sulfonate (col. 4, lines 10-60). These additives may be used in electroplating baths for electrodepositing copper, if such baths contain brightening

agents (col. 3, lines 73-75 to col. 4, lines 1-2), but fails to explicitly disclose the structure of the quaternary amine salt produced by the mixture represented by the following general formula:



Wherein $\text{R}^1, \text{R}^2, \text{R}^3, \text{R}^4, \text{R}^5, \text{R}^6$, and R^7 are each a methyl group or ethyl group, and n is a number from 1 to 1000.

Greaves discloses a method for inhibiting corrosion in aqueous systems comprising adding to the system a corrosion inhibiting salt (abstract; col. 1, lines 6-8) such as quaternary ammonium polymers derived from epichlorohydrin and various amines such as secondary and tertiary amines (col. 4, lines 59-68) having the formula:



Wherein n is a number from 0-500, although, other amines may also be employed, such as dimethylamine, triethanolamine, ethylene diamine and polyalkylene polyamines (col. 5, lines 1-10; claim 14). Therefore, one having ordinary skill in the art at the time of the

invention would have found it obvious to use an additive, as disclosed by Greaves, in the electrolytic solution of Strauss, in order to inhibit corrosion in an aqueous system.

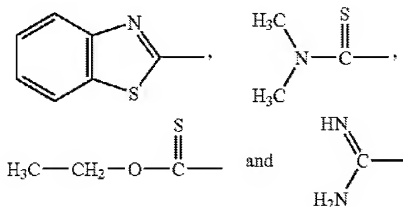
Even though Strauss in view of Greaves fails to explicitly teach wherein the electrolytic copper foil has a surface roughness R_z of 0.93 to 1.78 μm , an ordinary-temperature elongation of 3.10 to 10.34%, an ordinary-temperature tensile strength of 31.0 to 76.5 kgf/mm^2 , a high-temperature elongation of 8.8 to 18.5%, and a high-temperature tensile strength of 20.0 to 23.0 kgf/mm^2 , the applicant discloses in paragraph 56 of the instant invention wherein these properties are obtained when specific additives, such as the organic sulfur compound and quaternary amine compound having a specific structure, are added to the bath. Therefore, one having ordinary skill in the art would have found it obvious to conclude that since Strauss in view of Greaves teaches the organic sulfur compound and quaternary amine compound having the specific structure added in the bath, as claimed, the final product would contain the claimed properties as well.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strauss in view of Greaves, as applied to claim 7 above, in view of Barbieri (US Patent no. 4,555,315).

With regard to claim 4, Strauss discloses all of the limitations, as applied to claim 1 above but fails to explicitly teach wherein the organic sulfur compound is expressed by the following General Formula (3) or (4):



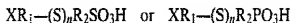
wherein in General Formulas (3) and (4), R^1 , R^2 , and R^3 are each an alkylene group with 1 to 8 carbon atoms, R^4 is selected from the group consisting of hydrogen,



X is selected from the group consisting of hydrogen, a sulfonic acid group, a phosphonic acid group, and an alkali metal salt or ammonium base of sulfonic acid or phosphonic acid, Y is selected from the group consisting of a sulfonic acid group, a phosphonic acid group, and an alkali metal salt of sulfonic acid or phosphonic acid, Z is hydrogen or an alkali metal, and n is 2 or 3).

Barbieri discloses an additive system for producing bright, ductile, level copper deposits with good recess brightness on metal substrates, enabling usage of higher plating current densities in electroplating equipment (col. 1, lines 12-18) wherein a copper electrolytic solution contains as additives: a polyepichlorohydrin quaternary

amine salt, and an organic sulfur compound (abstract; col. 1, lines 64-66). The organic sulfur compound may have the formula:



Wherein R_1 and R_2 are the same or different alkylene group containing from about 1 to 6 carbon atoms, X is hydrogen, SO_3H or PO_3H and n is a number from about 2 to 5 (col. 3, lines 25-42).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use a organic sulfur compound, as taught by Barbieri, in the electrolytic solution of Strauss, in order to produce bright, ductile, level copper deposits with good recess brightness on metal substrates, as well as to enable usage of higher plating current densities in electroplating equipment.

Response to Arguments

5. Applicant's arguments filed on May 4, 2009 have been fully considered but they are not persuasive. The applicant argues the following:

- a. The quaternary amine salt disclosed by Strauss excludes the use of a tertiary amine compound in combination with a secondary amine compound in the reaction with epichlorohydrin. In response, the examiner does not find this argument persuasive because Strauss teaches reacting a secondary amine with epichlorohydrin (example IV) and a tertiary amine to prevent impurities contained in the bath from interfering with the brightening action of the brightening agent (see claim 2; col. 1, lines 52-70; list of compounds in col. 2).

b. In the quaternary amine compound of the present invention, R₁ through R₇ are each methyl or ethyl groups and exclude a heterocyclic radical such as a morpholino group, as disclosed by Strauss. However, the examiner does not find this argument persuasive because Strauss also discloses linear amines (col. 2) which are suitable for modifying electroplating baths.

c. The quaternary ammonium polymer having a formula in col. 5 of Greaves is completely different from the quaternary amine salt of the present invention because 3 ethoxy groups are attached to the nitrogen, whereas the present invention requires R₁ to R₇ to be methyl or ethyl groups. In response, the examiner does not find this argument persuasive because Greaves explicitly teaches wherein the amines may be selected from the group consisting of dimethylamine, triethanolamine, ethylene diamine and polyalkylene polyamines (claim 14).

d. None of the references cited disclose wherein the electrolytic solution is for producing electrolytic copper foils. It is noted that this limitation only denotes the intended use of the claimed invention and thus, is not given patentable weight.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

7. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ZULMARIAM MENDEZ whose telephone number is (571)272-9805. The examiner can normally be reached on Monday-Friday from 9am to 5pm.

9. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Michener can be reached on 571-272-1424. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry D Wilkins, III/
Primary Examiner, Art Unit 1795

/Z. M./
Examiner, Art Unit 1795